

EXERCISES

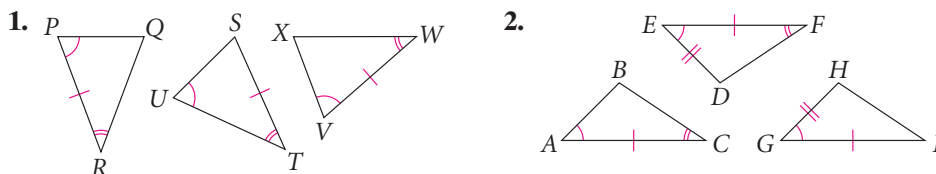
For more practice, see *Extra Practice*.

Practice and Problem Solving

A Practice by Example

Example 1 (page 195)

Developing Proof Name two triangles that are congruent by the ASA Postulate.

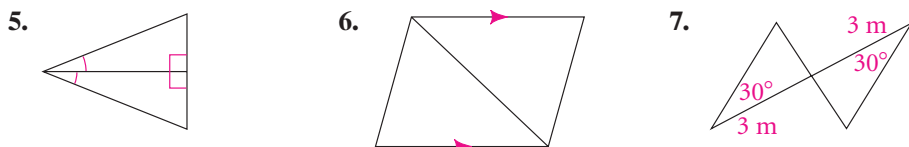


Answer each question without drawing the triangle.

- Which side is included between $\angle R$ and $\angle S$ in $\triangle RST$?
- Which angles include \overline{NO} in $\triangle NOM$?

Example 2 (page 195)

Developing Proof Tell whether the ASA Postulate can be used to prove the triangles congruent. If not, write *not possible*.

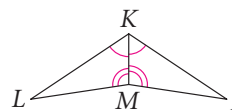


8. **Developing Proof** Complete the paragraph proof by filling in the blanks.

Given: $\angle LKM \cong \angle JKM$,
 $\angle LMK \cong \angle JMK$

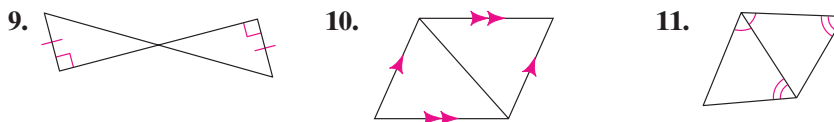
Prove: $\triangle LKM \cong \triangle JKM$

Proof: $\angle LKM \cong \angle JKM$ and $\angle LMK \cong \angle JMK$ are given. $\overline{KM} \cong \overline{KM}$ by the a. ? Property of Congruence.
 $\triangle LKM \cong \triangle JKM$ by the b. ? Postulate.



Example 3 (page 196)

Developing Proof Tell whether the AAS Theorem or the ASA Postulate can be applied directly to prove the triangles congruent. If not, write *not possible*.



12. $\angle E \cong \angle I$ and $\overline{FE} \cong \overline{GI}$. What else must you know to prove $\triangle FDE \cong \triangle GHI$ by AAS? by ASA?

13. **Developing Proof** Complete the proof plan by filling in the blanks.

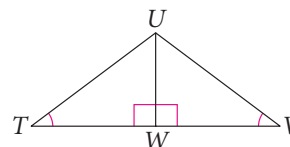
Given: $\angle UWT$ and $\angle UWV$ are right angles,
 $\angle T \cong \angle V$.

Prove: $\triangle UWT \cong \triangle UWV$

Plan: $\triangle UWT \cong \triangle UWV$ by AAS if $\angle T \cong \angle V$,
 $\angle UWT \cong$ a. ?, and $\overline{UW} \cong$ b. ?.

$\angle UWT \cong \angle UWV$ because all c. ? angles are congruent.

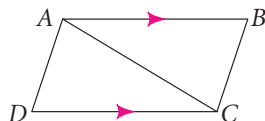
$\overline{UW} \cong \overline{UW}$ by the d. ? Property of Congruence.



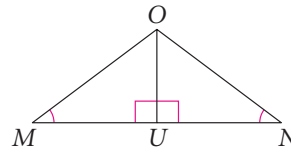
Example 4
(page 196)

Developing Proof What else must you know to prove the triangles congruent for the reason shown?

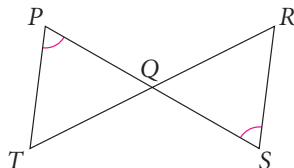
14. AAS



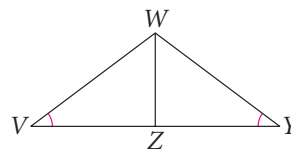
15. SAS



16. ASA



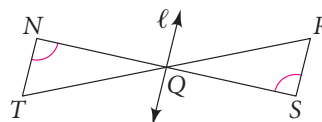
17. AAS



18. **Developing Proof** Complete the two-column proof by filling in the blanks.

Given: $\angle N \cong \angle S$, line ℓ bisects \overline{TR} at Q .

Prove: $\triangle NQT \cong \triangle SQR$

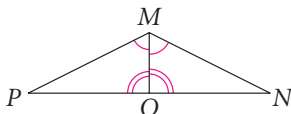


Statements	Reasons
1. $\angle N \cong \angle S$	1. Given
2. $\angle NQT \cong \angle SQR$	a. ?
3. ℓ bisects \overline{TR} at Q .	b. ?
c. ?	4. Definition of bisect
5. $\triangle NQT \cong \triangle SQR$	d. ?

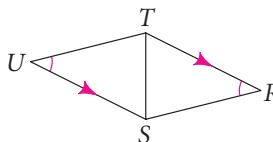
B Apply Your Skills

Developing Proof Write a congruence statement for each pair of triangles. Name the postulate or theorem that justifies your statement.

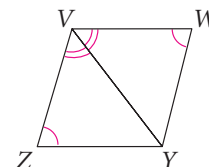
19.



20.



21.



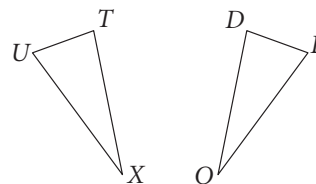
Developing Proof If the two triangles are congruent for the given conditions, write a congruence statement. Justify your conclusion.

22. $\angle D \cong \angle T$, $\angle E \cong \angle U$, $\overline{EO} \cong \overline{UX}$

23. $\angle D \cong \angle T$, $\angle E \cong \angle U$, $\angle O \cong \angle X$

24. $\overline{DO} \cong \overline{TX}$, $\angle D \cong \angle X$, $\angle O \cong \angle T$

25. $\overline{EO} \cong \overline{UX}$, $\angle E \cong \angle U$, $\overline{DO} \cong \overline{TX}$



26. **Writing** Anita says that you can rewrite any proof that uses the AAS Theorem as a proof that uses the ASA Postulate. Do you agree with Anita? Explain.

Developing Proof In Exercises 27–29, complete each proof or proof plan.

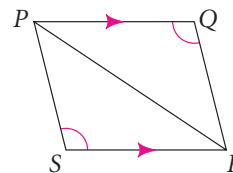
27. **Given:** $\overline{PQ} \parallel \overline{SR}$, $\angle Q \cong \angle S$

Prove: $\triangle QPR \cong \triangle SRP$

Plan: $\triangle QPR \cong \triangle SRP$ by AAS if

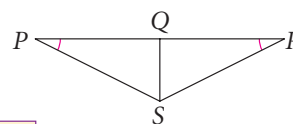
$\angle Q \cong \angle S$, $\angle QPR \cong$ a. $\underline{\hspace{1cm}}$, and $\overline{PR} \cong$ b. $\underline{\hspace{1cm}}$.

$\angle QPR \cong \angle SRP$ because they are c. $\underline{\hspace{1cm}}$ angles for the given parallel lines and the transversal d. $\underline{\hspace{1cm}}$. $\overline{PR} \cong \overline{PR}$ by the e. $\underline{\hspace{1cm}}$ Property of Congruence.



28. **Given:** \overline{SQ} bisects $\angle PSR$, $\angle P \cong \angle R$.

Prove: $\triangle PSQ \cong \triangle RSQ$



\overline{SQ} bisects $\angle PSR$.

a. ?

$\angle PSQ \cong \angle RSQ$

b. ?

$\angle P \cong \angle R$

c. ?

$\overline{SQ} \cong \overline{SQ}$

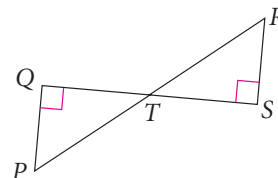
d. ?

$\triangle PSQ \cong \triangle RSQ$

e. ?

29. **Given:** $\overline{PQ} \perp \overline{QS}$, $\overline{RS} \perp \overline{QS}$,
 T is the midpoint of \overline{PR} .

Prove: $\triangle PQT \cong \triangle RST$



Statements

Reasons

1. $\overline{PQ} \perp \overline{QS}$, $\overline{RS} \perp \overline{QS}$
2. $\angle Q$ and $\angle S$ are right angles.
3. $\angle Q \cong \angle S$
- c. ?
5. T is the midpoint of \overline{PR} .
6. $\overline{PT} \cong \overline{RT}$
7. $\triangle PQT \cong \triangle RST$

1. Given
- a. ?
- b. ?
4. Vertical angles are congruent.
5. Given
- d. ?
- e. ?



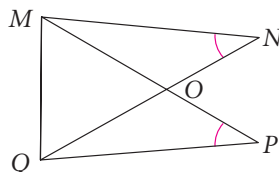
Need Help?

In Exercise 30, copy one angle, a side, and then another angle so that the copied angles include the copied side.

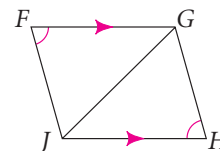
30. **Constructions** Using a straightedge, draw a triangle. Label it $\triangle JKL$. Construct $\triangle MNP \cong \triangle JKL$ so you know that the triangles are congruent by ASA.

Developing Proof Can you deduce the “Conclusion” from the “Given” information? Explain.

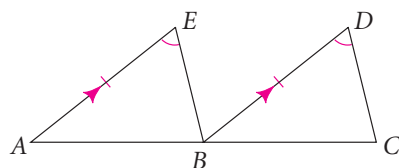
31. **Given:** $\angle N \cong \angle P$, $\overline{MO} \cong \overline{QO}$
Conclusion: $\triangle MON \cong \triangle QOP$



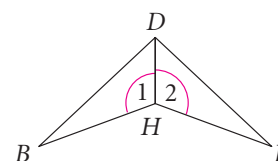
32. **Given:** $\angle F \cong \angle H$, $\overline{FG} \parallel \overline{JH}$
Conclusion: $\triangle FGJ \cong \triangle HJG$



33. **Given:** $\overline{AE} \parallel \overline{BD}$, $\overline{AE} \cong \overline{BD}$,
 $\angle E \cong \angle D$
Conclusion: $\triangle AEB \cong \triangle BDC$



34. **Given:** \overline{DH} bisects $\angle BDF$,
 $\angle 1 \cong \angle 2$.
Conclusion: $\triangle BDH \cong \triangle FDH$



35. **Reasoning** If possible, draw two noncongruent triangles that have two pairs of congruent angles and one pair of congruent sides. If this is not possible, explain why.

Challenge

36. **a. Open-Ended** Draw a triangle. Draw a second triangle that shares a common side with the first one and is congruent to it.
b. Think about how you drew your second triangle. What postulate or theorem did you use to make the second triangle congruent to the first one?

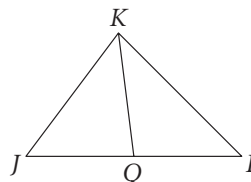
Use the figure at the right. Name as many pairs of congruent triangles as you can for the information given.

37. $ABCD$ is a parallelogram.

38. $ABCD$ is a rectangle.

39. **Reasoning** $\triangle JKL \cong \triangle MNP$.

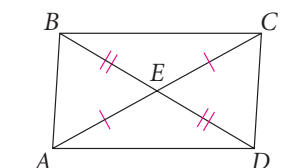
What additional information about \overline{KQ} and \overline{NR} will allow you to conclude that $\triangle JKQ \cong \triangle MNR$? Explain.



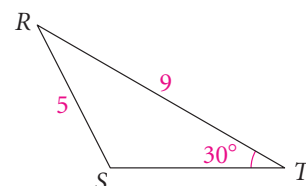
40. **Probability** Here are six congruence statements about the triangles at the right.

$$\begin{array}{lll} \angle A \cong \angle X & \angle B \cong \angle Y & \angle C \cong \angle Z \\ \overline{AB} \cong \overline{XY} & \overline{AC} \cong \overline{XZ} & \overline{BC} \cong \overline{YZ} \end{array}$$

There are 20 ways to choose a group of three statements from these six. What is the probability that three statements chosen at random from the six will guarantee that the triangles are congruent?



41. $\triangle RST$ at the right is with $RS = 5$, $RT = 9$, and $m\angle T = 30$. Show that there is no SSA congruence rule by constructing $\triangle UVW$ with $UV = 5$, $UW = 9$, and $m\angle W = 30$, but with $\triangle UVW \not\cong \triangle RST$.



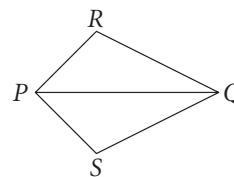
Standardized Test Prep

Multiple Choice

42. Which of the following is NOT a method used to prove triangles congruent?
 A. AAS B. ASA C. SAS D. SSA
43. Suppose $\overline{RT} \cong \overline{ND}$ and $\angle R \cong \angle N$. What additional information is needed to prove $\triangle RTJ \cong \triangle NDF$ by ASA?
 F. $\angle T \cong \angle D$ G. $\angle R \cong \angle N$ H. $\angle J \cong \angle D$ I. $\angle T \cong \angle F$

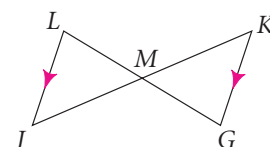
Short Response

44. \overline{PQ} bisects $\angle RPS$ and $\angle RQS$. Justify each answer.
 a. Which pairs of angles, if any, are congruent?
 b. By what theorem or postulate can you prove that $\triangle PRQ \cong \triangle PSQ$?



Extended Response

45. $\overline{LJ} \parallel \overline{KG}$ and M is the midpoint of \overline{LG} .
 a. Why is $\overline{LM} \cong \overline{GM}$?
 b. Can the two triangles be proved congruent by ASA? Explain.
 c. Can the two triangles be proved congruent by AAS? Explain.



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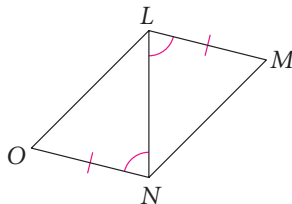
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Mixed Review

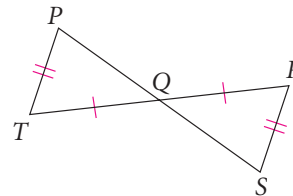
Lesson 4-2

In Exercises 46 and 47, decide whether you can use the SSS Postulate or the SAS Postulate to prove the triangles congruent. If so, write the congruence statement and name the postulate. If not, write *not possible*.

46.



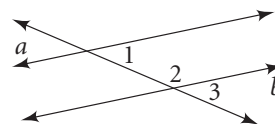
47.



48. For any $\triangle ABC$, which sides are *not* included between $\angle A$ and $\angle B$?

Lesson 3-2

49. State the theorem or postulate that justifies the statement:
If $\angle 1 \cong \angle 3$, then $a \parallel b$.



Lesson 1-7



Photography You want to arrange class-trip photos without overlap to make a 2 ft-by-3 ft poster. You collect 3 in.-by-5 in. and 4 in.-by-6 in. photos. What is the greatest number of each type of photo that you can fit on your poster?

50. 3 in.-by-5 in.

51. 4 in.-by-6 in.

52. What percent more paper is used for a large photo than a regular photo?